UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND
ONE CONGRESS STREET, SUITE 1100 (CPE)
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES.

NPDES PERMIT NO.: **MA0102156**

DATE OF PUBLIC NOTICE:

NAME AND ADDRESS OF APPLICANT:

Massachusetts Department of Mental Health
190 Portland Street
Boston, MA 02114

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Templeton Development Center
Department of Mental Retardation
212 Freight Shed Road
Baldwinville, MA 01436

RECEIVING WATER: **Beaver Brook to the Millers River**
Millers River Watershed (MA35-09)

CLASSIFICATION: **B (Cold Water Fishery)**

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has requested that the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection (DEP) reissue its NPDES permit to discharge 50,000 gallons per day (GPD) of treated municipal and industrial wastewater from a secondary treatment facility to the Beaver Brook.

Some portions of the October 22, 2002 reapplication and supplemental information submitted to EPA by the Templeton Development Center Facility (TDC) Director are paraphrased in this document without further reference. All documents used in the preparation of the permit and fact sheet are part of the administrative record and are retained on file by EPA.

II. Description of Discharge

The plant has a deign flow of 0.05 MGD (50,000 GPD). Influent is conveyed from the Templeton Development Center Campus and farm by two lift pumps which are: the Valley Barn Lift Station and the Waite House Pump Station. The collection system is completely separate. Raw influent water passes through a bar rack followed by an aerated grit chamber. Grit is disposed of with the solids. From the grit chamber, flow passes though a comminutor, to a splitter box which feeds two primary and secondary treatment package plants. The treated effluent receives UV disinfection prior to discharge to Beaver Brook. Sludge is trucked to the Town of Templeton POTW (NPDES Permit No. MA0100340).

III. Limitations and Conditions

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

IV. Permit Basis and Explanation of Effluent Limits Derivation

Brief history of NPDES actions

July 29, 1977	NPDES Permit Issued
September 30, 1999	NPDES Permit reissued
October 22, 2002	NPDES Reapplication submitted to EPA
August 17, 2004	Tour of facility by D. Corb, EPA

The Clean Water Act (CWA or the Act) prohibits the discharge of pollutants to waters of the United States without an NPDES permit unless such a discharge is otherwise authorized by the Act. A NPDES permit is used to implement technology based and water quality based effluent limitations as well as other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with statutory and regulatory authorities established pursuant to the Act. The regulations governing the NPDES program are found in 40 CFR Parts 122, 124, 125, and133.

Waterbody Classification, Usage and current Water Quality

The Beaver Brook is classified as a Class B waterbody and a Cold Water Fishery by the Massachusetts Surface Water Quality Standards, 314 Code of Massachusetts Regulations [314 CMR 4.05(3)(b)] which states that Class B waters have the following designated uses*:*

"These waters are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value."

Cold water fisheries are defined as those waters in which the temperature does not exceed 68°F (20°C). In cold water fisheries the rise in temperature due to a discharge shall not exceed (1.7°C).

The report titled, Millers River Watershed 2002 Water Quality Assessment Report, provides a summary of current water quality data and information for the Beaver Brook and watershed. The Templeton Development Center discharge is located in segment MA 35-09, *Location: Templeton Development Center (formerly Fernald School) discharge, Templeton to confluence with Millers River, Royalston. Segment length 3.1 miles.* The brook is being investigated by MassDEP for priority organics, metals, and pathogens.

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those water-bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such require the development of total maximum daily loads (TMDL). The Massachusetts 2002 Integrated List of Waters, Combined CWA Section 305(b) and 303(d) Report and the 2004 Proposed List, details the pollutants requiring a TMDL in Beaver Brook Segment MA35-09 as: priority organics (PCBs), metals, and pathogens.

Municipal Wastewater Treatment Facility [also referred to as "Publicly Owned Treatment Works" or POTW Discharges] Effluent Limits Regulatory Basis

The Massachusetts Surface Water Quality Standards, 314 CMR 4.00, include the requirements for the regulation and control of toxic constituents and require that EPA criteria established pursuant to Section 304(a) of the CWA shall be used unless site specific criteria are established. The state will limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained.

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that caused, or has reasonable potential to cause, or contributes to an excursion above any water quality criterion [40 CFR §122.44(d)(1)]. An excursion occurs if the projected or actual instream concentrations exceed the applicable criterion. In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and where appropriate, the dilution of the effluent in the receiving water.

Also note that according to EPA regulations 40 CFR § 122.44(l), when a permit is reissued, effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards or conditions in the previous permit, unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued.

River Flow and Available Dilution Calculation

Water quality based limitations are established with the use of a calculated available dilution. Title 314 CMR 4.03(3)(a) requires that the effluent dilution be calculated based on the receiving water 7Q10 flow. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10 year recurrence interval. Additionally, the discharge design flow is used to then calculate the available effluent dilution as required by 40 CFR §122.45(b)(1).

Section A.6(a) of the October 24, 2002 Permit Re-application stated that the design flow is 0.6 MGD. Joseph Farrell, the TDC Wastewater Treatment Plant Operator explained that there are conflicting design flow values in various manuals at the plant in a telephone conversation between Doug Corb (EPA) and Mr. Farrell, on June 27, 2005. Mr. Farrell said that the correct design flow of 0.05 MGD should be carried forward from the current permit.

The previous Fact Sheet (Attachment A) dated April 19, 1999 detailed the calculation of the 7Q10. The calculation of the 7Q10 is based on a United States Geological Survey (USGS) estimation formula that is used in the absence of more specific watershed data.

A dilution factor of 3.3 was used to calculate the water quality- based limits in the current permit (dated September 30, 1999). The estimated 7Q10 was 0.1776 cfs, calculated using a drainage area of 7.88 square miles and a flow factor of 0.02 cfs per square mile (the value was not calculated correctly and should have been 0.1576cfs. The dilution factor was checked by using Streamstats, a web-based tool provided by USGS, and by comparing these results to a partial record USGS gage on Beaver Brook, downstream of the discharge, and by gage data for other similar streams.

The Streamstats estimate of drainage area upstream of the discharge was 6.2 square miles and the estimated 7Q10 was 0.39 cfs (the drainage area calculated by Streamstats was determined to be correct, rather than the 7.88 square miles used for the current permit). Streamstats also estimated a 7Q2 of 0.84 cfs. The partial record gage station downstream of the discharge has a drainage area of 8.88 square miles; the 7Q10 is not provided, but the 7Q2 is estimated to be 0.6 cfs. There is an obvious disagreement between the Streamstats estimate and the gage estimate, given that the 7Q2 for the gage, located downstream of the discharge, has a lower 7Q2.

In order to reconcile these differences, a Streamstats estimate of flow was performed for the partial record gage station location, and 7Q2 and 7Q10 gaged flows were reviewed for three similar streams in the area. The data which was gathered is shown in the Table below.

Site	Area (mi^2)	7Q10 (cfs)	7Q10 flow factor (cfs/mi^2)	7Q2 (cfs)	7Q2 flow factor (cfs/mi^2)	7Q2 / 7Q10
Beaver Brook at TDC (Streamstats)	6.2	0.39	0.063	0.84	0.135	2.15
Beaver Brook at gage (Streamstats)	8.8	0.65	0.073	1.34	0.15	2.06
Beaver Brook at gage (gage)	8.8	----	----	0.6	0.068	---
Tarbell Brook Winchendon (gage)	17.8	1.1	0.061	2.4	0.134	2.18
Priest Brook, Winchendon (gage)	19.4	0.38	0.020	1.6	0.082	4.2
Moss Brook Wendell Depot (gage)	12.1	0.56	0.046	1.2	0.099	2.14

As can be seen by the data, the flow factors for Tarbell Brook in Winchendon closely match the Streamstats estimates. The flow factors for the other two reference sites and the gage on Beaver Brook are significantly less than these estimates. Also, with the exception of Priest Brook, the ratio of 7Q2 flow to 7Q10 flow is approximately two.

To further understand the drainage area contributing to Beaver Brook, USGS topographic quadrangle maps were reviewed. It appears that the headwaters of Kendall Brook, a tributary of Beaver Brook, is impounded in the Bates Power Reservoir. This would serve to reduce the actual drainage area that contributes flow to Beaver Brook during low flow periods by about one square mile. Flows and flow factors were adjusted to reflect this reduced drainage area and are shown in the following Table.

The revisions to the Streamsats flow estimates were made by maintaining the flow factors and re-calculating flows based on the reduced area. The gaged 7Q2 flow at the Beaver Brook gage was not adjusted, but the flow factor was adjusted upwards based on the reduced area; the 7Q10 flow was then calculated using a 7Q2/7Q10 ratio of 2.0. The estimated flow at TDC was then calculated using the flow Beaver Brook gage flow factors and a drainage area of 5.2 square miles.

Site	Area (mi^2)	7Q10 (cfs)	7Q10 flow factor (cfs/mi^2)	7Q2 (cfs)	7Q2 flow factor (cfs/mi^2)	$\frac{7Q2}{7Q10}$
Beaver Brook at TDC (Streamstats)	5.2	0.33	0.063	0.70	0.135	2.12
Beaver Brook at gage (Streamstats)	7.8	0.57	0.073	1.17	0.15	2.05
Beaver Brook at gage (gage)	7.8	0.3	0.038	0.6	0.077	2.0
Beaver Brook at TDC (based on gage flow factors)	5.2	0.2	0.038	0.4	0.077	2.0

As can be seen, these adjustments do not reconcile the difference between the Streamstats estimates and the gage measurements. Since the gage data reflects actual flow measured in the stream during low flow and is more conservative, we have adopted the 7Q10 calculated from the gage data (0.2 cfs) for calculating the dilution factor.

The 7Q10 for Beaver Brook at the TDC discharge is 0.2 CFS or 0.13 MGD.

Design Q dilution: $\frac{\text{Design Q + 7Q10 Q}}{\text{Design Q}} = \frac{\text{0.05 MGD + 0.13 MGD}}{\text{0.05 MGD}} = 3.6$

Conventional Pollutants and Non-Conventional Pollutants

Flow

The TDC has a design flow of 0.050 MGD. The annual average flow s for 1999-2002 were approximately 0.0265 MGD with maximum daily flow rates approaching 0.04 MGD. The design flow is used in calculating effluent limits per 40 CFR § 122.45(b)(1). Flow will be reported as an annual average flow, using monthly average flows from the previous eleven months. This change is consistent with other Massachusetts POTW permits as they are reissued.

BOD & TSS

The draft permit includes average monthly 85% percent removal of BOD and TSS limitations which are based on the secondary treatment requirements in 40 CFR §133.102(a)(3).

The draft permit includes technology based average monthly and average weekly mass and concentration limitations based on the secondary treatment requirements found at 40 CFR §133. Calculations of maximum allowable loads for average monthly and average weekly BOD_5 and TSS are based on the following equation and (40 CFR §122.45(f)):

L	=	C x DF x 8.34 where,
L	=	Maximum allowable load in lbs/day
C	=	Maximum allowable effluent concentration for reporting period in mg/l. Reporting periods are average monthly, average weekly and daily maximum.
DF	=	Design flow of facility in MGD.
8.34	=	Factor to convert effluent concentration in mg/l and flow in MGD to lbs/day.

[30] x 0.05 x 8.34 = 13 lbs/day	Average Monthly BOD_5 and TSS Load
[45] x 0.05 x 8.34 = 19 1lbs/day	Average Weekly BOD_5 and TSS Load

The frequency for sampling remains once per week.

pH

The pH limits in this draft permit are more stringent than the requirements found in 40 CFR §133.102(c). The limits are based on the state water quality standards for Class B waters [314 CMR 4.05(3)(b)], which specify an (in-stream) pH range of 6.5 to 8.3 S.U.. The frequency of monitoring remains at once per day.

Total Residual Chlorine (TRC)

There are no TRC limits in the draft permit as the facility now employs ultraviolet disinfection in place chlorine. The permit allows seasonal disinfection as approved by the MADEP under the provisions of 314 CMR 4.05(b)(4).

Fecal Coliform

The fecal coliform limits are based on state water quality standards for Class B waters [314 CMR 4.05(b)(4)]. The frequency of monitoring remains at once per week. Coliform limits are seasonal, from April 1 through October 31 of each year at the discretion of the DEP, 314 CMR 4.05(b)(4).

Toxic Pollutants

EPA conducted a review of the permit application, whole effluent toxicity test reports, Discharge Monitoring Reports (DMR), and The Millers River 2002 Water Quality Assessment Report looking for reasonable potential for the effluent to cause or contribute an exceedance of in stream Water Quality Criteria. Ammonia and total copper in the TDC effluent were found to have reasonable potential to cause or contribute to an exceedence of in-stream water quality criteria.

CHEMICAL DATA FROM WHOLE EFFLUENT TOXICITY REPORTS						
Date	Ammonia Influent	Ammonia Effluent	Copper Influent	Copper Effluent	Hardness Influent	Hardness Effluent
08/01	<0.10	<0.10	0.0815	0.1165	14	49
09/01	<0.10	<0.10	0.002	0.008	26	62
01/02	0.20	**9.43**	0.0786	0.0632	30	75
04/02	<0.10	<0.10	0.142	0.0029	17	59
07/02	<0.10	0.18	0.0040	0.0186	23	57
01/03	<0.10	0.94	<0.0010	0.0044	17	77
04/03	<0.1	0.9	<0.002	0.004	15	93
07/03	<0.1	0.4	0.004	0.006	19	74
10/03	<0.1	<0.1	<0.002	0.006	10	50
01/04	<0.1	0.1	0.003	0.012	17	85
04/05	<0.1	<0.1	<0.002	<0.002	12	80
Average	0.11	********	0.018	0.022	18	69

Total Ammonia Nitrogen

Nitrogen in the form of ammonia can be toxic to aquatic life. The toxicity level of ammonia depends on the temperature (for chronic toxcity) and the pH of the receiving water.

Whole effluent toxicity report data provided by the permittee was compared to the EPA recommended aquatic life criteria for ammonia*, multiplied by the dilution factors, to establish whether “reasonable potential” exists for the POTW effluent to cause or contribute an in-stream exceedance of the State Water Quality Criteria concentrations.

*EPA 1999 Update of Ambient Water Quality Criteria for Ammonia, Office of Water, EPA-822-R-99-014, December 1999.

The EPA recommended criteria are adopted into the State Water Quality Standards pursuant to 314 CMR §4.05(5)(c).

Historical in-stream pH data collected above the discharge as part of the reporting requirements for whole effluent toxicity testing was used with effluent pH valuse obtained from Discharge Monitoring Reports to establish the pH used in the calculation of ammonia limits.

WET Data

Date	River Dilution Water pH
01/02	6.14
04/05	7.49
08/01	5.82
09/01	7.33
04/02	7.12
07/02	6.11
01/03	6.81
04/03	7.15
07/03	6.12
09/03	6.11
01/04	7.78

In-stream pH data from February 2002 through February 2005 was examined. EPA found that a pH value of 7.33 SU is the highest pH for the June-September periods.

Ammonia Limit Calculation:

(chronic criteria)(dilution) = chronic limit

(3.6 mg/l)(3.6) =13.0 mg/l ammonia at 20 degrees C and pH of 7.3 SU

Highest reported effluent ammonia concentration value from DMRs = 23 mg/l

An average monthly discharge limit of 13.0 mg/l is calculated for the period of April through October. The applicable ambient chronic criteria for April through October is 3.6 mg/l based on a receiving water pH of 7.3 SU, a receiving water temperature range of 20 degrees Celsius and the presence of early life stages of the most sensitive species used to derive the criteria (see EPA 1999 Update of Ambient Water Quality Criteria for Ammonia). The Millers River Watershed 2002 Water Quality Assessment Report recorded the highest river temperature as 20.5 degrees Celsius during the month of July. The current limit of 10 mg/l has been carried forward based on the State anti-degradation requirements found at 314 CMR 4.04.

The acute criteria for ammonia is pH dependant, but not temperature dependant. The acute ammonia criteria for a pH of 7.3 SU with Salmonids present is 17.5 mg/l. The acute criteria multiplied by the dilution factor of 3.6 yields a concentration of 63 mg/l. The highest reported effluent ammonia value (April, 2002 through April, 2004) of 23 mg/l establishes that there is no reasonable potential for discharge to cause or contribute to an exceedance of the acute in-stream Water Quality Criteria for ammonia.

The monitoring frequency remains the same in the draft permit as in the current permit, at once per week.

Nitrogen Monitoring: Total Nitrogen, Total Kjeldahl Nitrogen, Total Nitrate and Total Nitrite:

It has been determined that excessive nitrogen loadings are causing significant water quality problems in Long Island Sound, including dissolved oxygen. The State of Connecticut has begun to impose nitrogen limitations on Connecticut discharges to Long Island Sound and its tributaries. EPA agrees there is a need to determine the loadings of nitrogen from sources in Massachusetts which are tributary to Long Island Sound, and to help determine what limits, if any should be imposed on discharges in Massachusetts. The Beaver Brook flows into the Millers River, which in turn, flows into the Connecticut River and Long Island Sound. Therefore, based on Section 308 of the Clean Water Act, EPA has included annual requirements for testing for total nitrogen as Kjeldahl nitrogen, nitrate and nitrite in the draft permit.

The information submitted by the permittee will help to establish a database of nitrogen loadings, which can be used quantitatively to assess the impact of loading and transport to Long Island Sound.

The monitoring data will provide a more sound decision making basis in any future decisions relating to nitrogen loadings to the Sound. This monitoring requirement may be removed by the agencies after sufficient data collection.

Total Copper

The draft permit includes average monthly and maximum daily limits of 12.3 ug/l and 17.8 ug/l, respectively, at a hardness of 36.2 mg/l as $CaCO_3$. Although copper samples taken as part of whole effluent toxicity testing over the past two years indicate improvement, previous data and the effluent variability indicate there still remains a reasonable potential for the discharges to cause or contribute to an exceedance of the state criteria for copper as defined in 40 CFR §122.44(d). The permittee will be required to sample quarterly. The permittee may enter the total copper data from the WET reports on the Discharge Monitoring Reports (DMR) to satisfy this requirement without conducting redundant testing.

EPA's recommended criteria for copper, as adopted by Massachusetts into the water quality standards, are hardness dependant. The toxicity of total copper to aquatic organisms is reduced as the hardness concentration in the receiving water increases. In a letter dated July 7, 2000 EPA's Office of Water - Office of Science and Technology stated that: *The hardness of the water containing the discharged toxic metal should be used for determining the applicable criterion. Thus, the downstream hardness should be used.* See equations below for water quality criteria for hardness-dependent metals.

The downstream hardness is calculated using receiving water and effluent hardness values from whole effluent toxicity tests submitted by the permittee.

Downstream Hardness

$$C_r = \frac{Q_d C_d + Q_s C_s}{Q_r} = \frac{(0.05\ MGD)(69\ mg/l) + (0.13\ MGD)(18\ mg/l)}{(0.18\ MGD)} = 32.2\ mg/l$$

Where:

Q_s = River flow upstream of plant
Q_d = Discharge flow from plant
Q_r = 7Q10 river flow measured downstream of the plant
C_s = Upstream river concentration (see table on page 6)
C_d = Plant discharge concentration (see table on page 6)
C_r = Receiving water concentration

Acute Criteria (dissolved) = $\exp\{m_a [\ln(\text{hardness})] + b_a\}$ (CF)

Where: m_a = pollutant-specific coefficient
b_a = pollutant-specific coefficient
h = hardness of the receiving water = 32.2 mg/l as $CaCO_3$
ln = natural logarithm
CF = pollutant-specific conversion factor
(CF is used to convert total recoverable to dissolved metal)

Chronic Criteria (dissolved) = $\exp\{m_c [\ln(\text{hardness})] + b_c\}$ (CF)

Where: m_c = pollutant-specific coefficient
b_c = pollutant-specific coefficient
h = hardness of the receiving water = 32.2 mg/l as $CaCO_3$
ln = natural logarithm
CF = pollutant-specific conversion factor
(CF is used to convert total recoverable to dissolved metal)

Calculation - acute and chronic limits for total copper:

Where:

m_a = 0.9422	b_a = -1.700	CF = 0.960
m_c = 0.8545	b_c = -1.702	CF = 0.960

Acute criteria (dissolved) = exp{0.9422 [ln(32.2)] - 1.700} (0.960) = 4.6 ug/l

Dilution Factor = 3.6

Effluent Limitation: = (4.6 ug/l x 3.6) = 16.6 ug/l (dissolved)
Total recoverable = 16.6 / CF = 16.6 / 0.960 = **17.3 ug/l** *

Chronic criteria (dissolved) = exp{0.8545 [ln(32.2)] - 1.702 } (0.960) = 3.4 ug/l

Effluent Limitation: = (3.4 ug/l x 3.6) = 12.24 ug/l (dissolved)
Total recoverable = 12.24 / CF = 12.24 / 0.960 = **12.8 ug/l** *

* An inverse conversion factor is used to determine total recoverable metal. The EPA Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion (EPA- 823-B-96-007) is used as the basis for using the criteria conversion factor. 40 CFR §122.45(c) requires that permit limits be based on total recoverable metals and not dissolved metals. Consequently, it is necessary to apply a translator in order to develop a total recoverable permit limit from a dissolved criteria. The translator reflects how a discharge partitions between the particulate and dissolved phases after mixing with the receiving water. In the absence of site specific data on how a particular discharge partitions in the receiving water, a default assumption that the translator is equivalent to the criteria conversion factor is used in accordance with the Translator Guidance.

Whole Effluent Toxicity

Under Section 301(b)(1) of the CWA, discharges are subject to effluent limitations based on water quality standards. The State Surface Water Quality Standards [314 CMR 4.05(5)(e)], include the following narrative statements and require that EPA criteria established pursuant to Section 304(a)(l) of the CWA be used as guidance for interpretation of the following narrative criteria:

> "All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. Where the State determines that a specific pollutant not otherwise listed in 314 CMR 4.00 could reasonably be expected to adversely affect existing or designated uses, the State shall use the recommended limit published by EPA pursuant to 33 U.S.C. 1251 §304(a) as the allowable receiving water concentrations for the affected waters unless a site-specific limit is established. Site specific limits, human health risk levels and permit limits will be established in accordance with 314 CMR 4.05(5)(e)(1)(2)(3)(4)."

National studies conducted by the EPA have demonstrated that domestic sources contribute toxic constituents to WWTFs above those which may be contributed from industrial users. These pollutants include metals, chlorinated solvents, aromatic hydrocarbons and other constituents.

The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analysis; (2) bioavailability of pollutants after discharge is measured by toxicity testing including any synergistic effect of pollutants; and (3) pollutants for which there are inadequate analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in connection with pollutant-specific control procedures to control the discharge of toxic pollutants.

In order to evaluate the toxicity of the TDC discharge, the permittee is currently required to conduct acute (LC_{50}) and chronic (C-NOEC) whole effluent toxicity (WET) testing using one organism, the daphnid Ceriodaphnia dubia. The LC_{50} limit is $\geq$100%.

The $\geq$30% chronic no observable effects concentration (C-NOEC) limit in the current permit is calculated based on the inverse of the receiving water concentration (1/3.3X 100% = $\geq$30%). The calculated C-NOEC limits based on the updated dilution is 1/3.6 X 100% = $\geq$28%. Based on the State anti-degradation requirements found at 314 CMR 4.04, the current C-NOEC limit of $\geq$30% is being retained in the draft permit.

The WET tests are required four times per year, during the months of January, April, July, and October, with results to be submitted by the last day of the following month. These months are chosen to be consistent with the facilities in the Millers River Watershed. Quarterly WET testing is carried forward in this draft permit. See Fact Sheet Attachment A for recent WET monitoring results.

WET testing shall be conducted in accordance with EPA Region I's Toxicity Test Procedure and Protocol found in **Attachment A** of the draft permit.

If toxicity test(s) using receiving water as dilutant show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in the Toxicity Procedure and Protocol, Attachment A, Section IV. Dilution Water, in order to obtain permission to use alternate dilution water. In lieu of individual approvals for alternate dilution water required in Permit Attachment A, EPA-New England has developed a Self-Implementing Alternative Dilution Water Guidance document (called "Guidance Document") which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. The policy authorizes alternate dilution water use:

(1) in any WET test repeated due to site water toxicity. No prior notification to EPA is required for any current test that needs to be repeated due to site water toxicity; and

(2) in future WET tests where there are two previously documented incidents of site water toxicity associated with a particular test species. Written notification to EPA is required before switching to alternate dilution water testing for the duration of the life of the permit.

If this Guidance Document is revoked, the permittee shall revert to obtaining approval as outlined in **Attachment A** of the draft permit.

The "Guidance Document" has been sent to all permittees with their annual set of DMRs and Revised Updated Instructions for Completing EPA's Pre-Printed NPDES Discharge Monitoring Report (DMR) Form 3320-1 and is not intended as a direct attachment to the permit. Any modification or revocation to this "Guidance Document" will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in **Permit Attachment A**.

Total Phosphorus

In freshwater systems including rivers, streams and impoundments, phosphorus is usually the limiting nutrient for primary production. Phosphorus promotes the growth of nuisance algae and aquatic plants and when these plants and algae undergo their decay processes, they generate odors and result in lower dissolved oxygen levels in the river and impair the fish community.

The 2002 Millers River Watershed, Water Quality Assessment Report, Page 133, recommends that; *The permit should be reissued with appropriate limits and monitoring requirements including a requirement for a phosphorus loading, evaluation and reduction program (a total phosphorus limit will likely be imposed).*

The Massachusetts Surface Water Quality Standards (WQS) (314 CMR 4.00) do not contain numerical criteria for TP. The 'criteria' for nutrients is found at 314 CMR 4.05(5)(c), which states that nutrients shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication. The WQS require any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae will ultimately require water quality limits based on a Total Maximum Daily Load (TMDL) study. If a TMDL is not available, non-watershed specific water quality limits or highest and best practical treatment (HBPT) limits shall be provided to remove such nutrients.

A TMDL study determines the maximum amount of a pollutant that a waterbody can receive and still meet WQS, and the allocations of that amount to the pollutant's sources, such as the Templeton POTW discharge.

Because a TMDL study for nutrients is not currently available for the Beaver Brook, phosphorus limits must meet either non-watershed specific water quality based limits or a technology based HBPT limit. The DEP has established that, a monthly average TP limit of 200 ug/l (or 0.2 mg/l) represents HBPT for municipal wastewater treatment facility effluent discharged to a nutrient impaired water body. The HBPT limit of 0.2 mg/l was derived from a literature search of generally accepted treatment technologies for the removal of phosphorus and is likely attainable by existing treatment technologies. Furthermore, EPA's Technical Transfer guidance published in 1987 (EPA 625/6-87/017) concludes that 0.2 mg/l is achievable with existing treatment technology.

EPA has produced several guidance documents which contain recommended total phosphorus criteria for receiving waters. The EPA's *Quality Criteria for Water 1986* (the Gold Book) recommends, in order to control eutrophication, in-stream phosphorus concentrations should be less than 100 ug/l (0.100 mg/l) in streams or other flowing waters not discharging directly to lakes or impoundments. More recently, EPA released Ecoregional Nutrient Criteria, established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country.

The published ecoregion-specific criteria represent conditions in waters minimally impacted by human activities, and thus representative of water without cultural eutrophication. Baldwinville is located within Ecoregion XIV, Eastern Coastal Plains. The total phosphorus criteria for this ecoregion is found in *Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV*, published in December, 2000, and is 24 ug/l (0.024 mg/l).

It is clear that the existing limits must be made more stringent to address the documented

eutrophication problems in the receiving water. Given that the state has not yet adopted numerical water quality based phosphorus criteria, the draft permit will not establish limits based on the Gold Book or EPA Ecoregion guidance at this time, but will instead establish a monthly average TP limit on the discharge of 0.2 mg/l, based on HBPT as defined by the MA WQS.

While this limit will not ensure attainment of EPA's recommended Gold Book or Ecoregion guidance criteria, it will result in a significant reduction in phosphorus concentrations in the receiving water and will result in a receiving water concentration of about 0.056 mg/l at the dilution factor of 3.6. See calculations below.

(HBPT) ÷(dilution factor) = (in-stream concentration)

0.2 mg/l ÷ 3.6 = 0.056 mg/l

The HBPT TP limit of 0.2 mg/l is a technology based limit; future permits may contain more stringent water quality based TP limits.

The monitoring frequency for the 0.2 mg/l TP limit is 1/week and is seasonal, from April 1st through October 31st to be consistent with other dischargers in the watershed.

In addition to the seasonal total phosphorus limit of 0.2 mg/l, the permit contains a winter period total phosphorus limit of 1.0 mg/l during the period from November 1 through March 31st of each year. The winter period limitation on total phosphorus is necessary to ensure that the higher levels of phosphorus discharged in the winter period do not result in the accumulation of phosphorus in the sediments.

The limitation assumes that the vast majority of the phosphorus discharged will be in the dissolved fraction and that dissolved phosphorus will pass through the system given the short detention time of the impoundments and the lack of plant growth during the winter period. In addition to the total phosphorus limits during the November through March period, the draft permit requires monitoring for dissolved ortho-phosphorus. The additional monitoring requirement will allow a determination of the fraction of the total phosphorus discharged by the TDC is likely pass through the watershed and what portion may be captured in the sediment.

If future evaluations indicate that phosphorus may be accumulating in the impoundments, the winter period phosphorus limit may be reduced in future permit actions. If, upon completion of a TMDL for nutrients based on a detailed study of eutrophication in the Beaver Brook and a detailed analysis of the TP loading from the TDC, it is determined that either a higher or lower limit will result in compliance with WQS, then the EPA and DEP may exercise the reopener clause in Part II.A.4 (General Conditions) and 40 CFR §122.62(a)(2) and modify the permit accordingly.

Effluent Monitoring

The effluent monitoring requirements have been specified in accordance with 40 CFR § 122.41(j), 122.44(i), and 122.48 to yield data representative of the discharge.

Anti-backsliding and Anti-degradation

A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. The anti-backsliding provisions found under Section 402(o) and 303(d)(4) of the CWA, as described in 40 CFR §122.44(l), prohibit the relaxation of permit limits, standards, and conditions. Therefore, the technology-based effluent limits in a reissued permit must be at least as stringent as those in the previous permit.

Effluent limits based on BPJ, water quality, and state certification requirements must also meet the anti-backsliding provisions found under Section 402(0) and 303(d)(4) of the CWA, as described in 40 CFR § 122.44(l).

Anti-backsliding does not apply to the discontinuance of settleable solids monitoring as the need to monitor this parameter is better measured by other means. The recalculated hardness values used in establishing whether there is a reasonable potential for the Templeton Development Center effluent to cause or contribute to an exceedance of the ambient in-stream criteria for chronic whole effluent toxicity is new information that was not available when the permit limits were established in the current permit. Chlorine will not be used once UV disinfection is installed and therefore, the TRC limits shall be discontinued.

Effluent limits based on water quality and state certification requirements must also meet the provisions found under 314 CMR 4.04 of the Massachusetts Anti-degradation Policy. All existing uses of the Beaver Brook must be protected. For this reason, WET and ammonia limits shall not be relaxed based on the higher (re)calculated dilution factor.

This draft permit is being reissued with allowable discharge limits as or more stringent than the current permit with the exception of the limitations for settleable solids. There is no change in the outfall location. The Commonwealth of Massachusetts has indicated that there will be no lowering of water quality and no loss of existing water uses and that no additional anti-degradation review is warranted.

V. Operation and Maintenance of Wastewater Treatment and Related Facilities

The permit standard conditions for “Proper Operation and Maintenance” are found at 40 CFR § 122.41(e). These require proper operation and maintenance of permitted wastewater treatment systems and related facilities to achieve permit conditions. Similarly, the permittee has a ‘duty to mitigate’ as stated in 40 CFR § 122.41(d).

This requires the permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit which has a reasonable likelihood of adversely effecting human health or

the environment. EPA and DEP maintain that these programs are an integral component of ensuring permit compliance under both of these provisions.

VI. Sludge Information and Requirements

The Templeton Development Center WWTF generates approximately 35 metric tons of sludge annually. The waste sludge is landfilled at a sludge only monofill disposal site owned and operated by the Town of Templeton, adjacent to the Templeton Treatment Plant (NPDES Permit No. MA0100340).

Section 405(d) of the CWA requires that EPA develop technical regulations regarding the use and disposal of sewage sludge. These regulations are found at 40 CFR Part 503 and apply to any facility engaged in the treatment of domestic sewage. The CWA further requires that these conditions be implemented through permits. The sludge conditions in the draft permit are intended to implement these regulations.

The draft permit requires that sewage sludge use and disposal practices meet the CWA Section 405(d) Technical Standards. In addition, EPA New England has included with the draft permit a 72-page *Sludge Compliance Guidance* document for use by the permittee in determining their appropriate sludge conditions for their chosen method of sludge disposal.

The permittee is also required to submit to EPA an annual report containing the information specified in the *Sludge Compliance Guidance* document for the permittee's chosen method of sludge disposal.

VII. State Certification Requirements

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection with jurisdiction over the receiving waters certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards.

The staff of the Massachusetts Department of Environmental Protection has reviewed the permit and advised EPA that the limitations are adequate to protect water quality. EPA has requested permit certification by the State and expects that the permit will be certified.

VIII. Public Comment Period and Procedures for Final Decision

All person, including applicants, who believe any condition of the permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to **Doug Corb, U.S. EPA, 1 Congress Street, Suite 1100-CMP, Boston, Massachusetts 02114-2023 and Paul Hogan, Department of Environmental Protection, Division of Watershed Management, 627 Main Street, 2nd Floor, Worcester, MA 01608**. Any person, prior to such date, may submit a request in writing for a public hearing to consider the permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing.

A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the decision to the applicant and each person who has submitted written comments or requested notice.

IX. EPA and MA DEP Contacts

Additional information concerning the permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

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Suite 1100 - CMP
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and

Paul Hogan
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March 7, 2006
Date

Linda M. Murphy, Director*
Office of Ecosystem Protection
U.S. Environmental Protection Agency

* Address comments to both Doug Corb and Paul Hogan